PROJECT FACT SHEET

CONTRACT TITLE: Imaging the Fault Separating the Saturated and Desaturated Potter Sand in the McKittrick Field, California. OIL RECOVERY TECHNOLOGY PARTNERSHIP.

DATE REVISED: January 1, 1990

OBJECTIVE: The proposal is a study of imaging of properties and structure of a producing oil reservoir. In the proposed work Interwell Acoustic Imaging (IAI) will be applied to the imaging of stratigraphic traps, formed through complex overthrusting, that are hypothesized to contain major undiscovered oil within an aging oil field. In addition, IAI will be used to attempt to image the interface between saturated and desaturated sands in formations where knowledge of the temporal location of the interface is important in devising proper production strategies as well as in estimating the ultimate production. The IAI work will be conducted in collaboration with the Texaco Exploration and Production Company, in the McKittrick Field, California.

CONTRACT NO: FEW PG18
CONTRACT AMT:
B AND R CODE:AC0530000

CONTRACTOR:
Los Alamos National Laboratory

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CONTRACT PERFORMANCE PERIOD:
06-22-89 TO 09-30-90
PROJECT BEGINNING: 06/89

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SCHEDULE MILESTONES:

Begin processing and analysis.....01/90
Complete analysis.....08/90
Complete and submit final report.....09/90

CONTR. FUNDING	FUNDING (1,000'S)	DOE	OTHER	CONTR.	TOTAL
	PRIOR FISCAL YRS	287	0	0	287
	FISCAL YR 1990	100	0	0	100
	FUTURE FUNDS	0	0		0
	TOTAL EST'D FUNDS	387	0	0	387

PROJECT DESCRIPTION: This project is a joint venture including Los Alamos (LA), Texaco & Chevron. Texaco will coordinate the planning & conduct the survey in the McKittrick Field. Texaco will conduct all preparations necessary to prepare wells 151, 806 and 418 for the interwell survey including the removal of tubulars, the setting of bridge plugs, & filling of wells with water. Texaco will provide two mast trucks or equivalent for use in wireline operations; electrical power to LA equipment; personnel having knowledge of typical field well conditions to assist with LA wireline operations; log & core information on Well 806 & collaborate with LA on the analysis & interpretation of data. Los Alamos will provide all hardware & personnel necessary to operate LA equipment at the McKittrick survey site & will coordinate with Texaco in all planning phases, analysis & interpretation of survey data. Chevron Oil Field Research Company, using the Texaco wells, would deploy geophones & a vibratory seismic source for acquiring low resolution shear wave interwell survey data. Chevron & Los Alamos work would overlap in the field and deploy both sources & receivers simultaneously. Objectives of the overlapping work are (I) to evaluate the performance of the LA geophone and crosswell receiver when used in conjunction with the Chevron transmitter, & (II) to acquire low resolution interwell data using the Chevron source and the LA receiver for comparison with data collected with the higher resolution LA source and receiver.

PRESENT STATUS: Analysis is ongoing of data acquired during the field experiments. All data will be shared among the Partnership from the various source and receiver combinations. Seismic Q tomograph, Poisson's ratio tomograph and wellbore heat transmission code are some of the results expected in the imaging of the McKrittick fault separating the saturated/desaturated Potter sands using a combination of data sources.

ACCOMPLISHMENTS: An interwell survey was conducted using 3 wells in the McKittrick Field in collaboration with Texaco. A second survey was conducted in each well pair with the source and receiver exchanged between wells. LANL deployed a high temp geophone package in one of the above wells in support of a tomographic survey conducted by Chevron using their source. Stacked, high-quality signals were acquired from 576 propagation paths in the depth interval encompassing the McKittrick fault structures and saturation interfaces. Direct compressional & shear wave data were acquired with sufficient amplitude resolution for seismic Q measurement.

BACKGROUND: The site chosen for the tests is Texaco's McKittrick Field, California in which 29 million barrels of potential reserves have been identified in fault related structures. Oil production at the McKittrick Field is from the Potter sand, a massive unconsolidated sand overlain by interbedded unconsolidated course-to-fine grain sands and shales. Potter Sand is both extremely porous and permeable. Conventional core and side-wall sample analysis along with log data, indicates porosities of 25% or higher. Permeabilities are more variable but generally range from 1 to 10 Darcys. Undersaturation within Potter sand results from loss of reservoir gas cap during middle Pleistocene erosional exposure of the sands and gravity drainage of the heavy oil due to production. Structurally, the McKittrick Field is a monocline dipping about 18 degrees northeast that is sealed up-dip by impermeable Miocene diatomite thrust by the McKittrick fault over younger sediments of Miocene through Pleistocene age. Mapping of the subthrust & the contact with desaturated sands between wells would significantly reduce the cost of further development wells in the field.